

## REMARKS

Claims 1-5, 7-11 and 14-22 and 24 are in this application and are presented for consideration. By this amendment, Applicant has amended claims 1, 7, 20 and 21. Claim 1 has been clarified and is believed to now patentably define over the prior art. Claim 20 has been amended to depend from claim 15. Claim 21 has been rewritten to include the subject matter of allowable claim 23 (claim 23 is now canceled). Claims 15– 19 have been allowed. And it is believed that at least claims 15-21, 22 and 24 are in allowable form. Claim 1 and claims depending thereon are presented for reconsideration in view of the amendments and discussion below.

Claim 7 has been rejected under 35 U.S.C. 112, second paragraph, as being indefinite. This claim has now been corrected. Applicant wishes to thank the Examiner for the helpful comments.

Claims 1–3, 7–11, 21 and 22 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Bannister (U.S. 4,626,999) in view of Hata et al (JP 6-170,565). Claim 4 has also been rejected as obvious based on these teachings that form the basis of the rejection of claim 1 and further in view of Ishida et al. (JP 63-108,979). Claim 5 has also been rejected as obvious based on these teachings that form the basis of the rejection of claim 1 and further in view of Faitel et al. Claim 14 has also been rejected as obvious based on these teachings that form the basis of the rejection of claim 1 and further in view of Takahashi (JP 10-58,279).

Applicant requests reconsideration of the rejection of claim 1 and the rejection of claims that depend thereon as the combined teachings do not provide direction or incentive to

provide the cooperating process features as claimed. The laser beam machining of components includes guiding a laser head with a manipulator with a multiaxial manipulator hand. The remote laser head is arranged externally on the manipulator hand. The laser head emits a laser beam. The emitted laser beam is guided along a welding or cutting path on the component by orientation modifications and with a variable irradiation angle  $\beta$ . The changes in the orientation of the laser beam are generated only by pivoting motions of the manipulator hand about at least one of the hand axes. At least the laser output power or the velocity of the welding or cutting is adjusted as a function of the changing irradiation angles  $\beta$  of the laser beam.

As the existing axes of the manipulator and auxiliary axes at or in the laser head are not important the robot control is simplified. This advantageously provides for rapid and precise movement of the laser beam due to the pivoting motions of the manipulator hand. The present invention also allows for a maximum possible welding velocity that can be maintained at the component, which advantageously allows for more weld seams to be produced than compared with conventional techniques.

Bannister fails to teach and fails to suggest the combination of adjusting one or more of laser power and velocity of welding based on an angle at which a laser beam is delivered to a component. Bannister merely discloses a multiaxial manipulator that carries a multiaxial robot hand, on which a laser tool is arranged on the outer side at a driven flange. Bannister does not provide any teaching or suggestion for changing laser power or velocity of the welding or both as a function of the changing angle at which the laser beam is delivered.

Claim 1 highlights the features that provide the benefits noted. The amended claim 1 also highlights the that one or more of a laser output and a velocity of welding or cutting is changed and adjusted as a function of a changing irradiation angles  $\beta$  of the laser beam. This avoids any reading off the claim in which claim 1 could be understood in the meaning of adjusting the said laser output and velocity of welding or cutting once without further adaption to the continuously changing angles  $\beta$ . With the invention when the angle  $\beta$  of the laser beam is changed only by moving the axis of the robot hand a permanently changing irradiation angle  $\beta$  will be the result. With the invention, this requires adjustment and adaption to changing irradiation angles  $\beta$  with one or more of a laser output and a velocity of welding or cutting being changed and adjusted as a function of changing irradiation angles  $\beta$  of the laser beam.

This adjustment and adaption to changing irradiation angles  $\beta$  is not taught and not suggested by Bannister (US 4,626,999 A) and is not taught and not suggested by Hata et al. (JP 6-170,565 A).

Hata et al. discloses a machining head 2 that is directly controlled by a control device 10 while a laser beam oscillator 1 is controlled by the control device 10 through an oscillator control means 11. This process delays the operation of the laser beam oscillator 1 to the machining head 2 by the degree corresponding to the operation through the oscillator control means 11. When a workpiece 4 is welded by a welding mode 15, the machining head 2 is moved simultaneously with the irradiation of the laser beam L at the welding starting position A, while the machining head 2 is stopped simultaneously with the stopping of the irradiation of the laser beam L in the welding finished position B. This is said to provide a uniform

welding width over the full area to be welded by substantially eliminating the delay in operation of a laser beam oscillator to a machining head.

The Hata et al, reference does not suggest modifying the process of Bannister to provide all of the process features as claimed. In particular, the references fail to provide teachings that the changes in the orientation of the laser beam are generated only by pivoting motions of the manipulator hand about at least one of the hand axes **and** one or more of a laser output and a velocity of welding or cutting is changed and adjusted as a function of a changing irradiation angles  $\beta$  of the laser beam. The prior art does not render the combined process features obvious. The combined teachings do not suggest a process with the features claimed and the combined teachings do not provide the advantages of the cooperating process features according to the invention. As such, the prior art as a whole fails to establish a *prima facie* case of obviousness as the cited prior art reference does not teach or suggest important features of the claimed combination.

Reconsideration of the rejection of claim 1 and claims that depend thereon is requested.  
Favorable consideration is requested.

Respectfully submitted  
for Applicant,



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Attached: Petition for Two Month Extension of Time

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